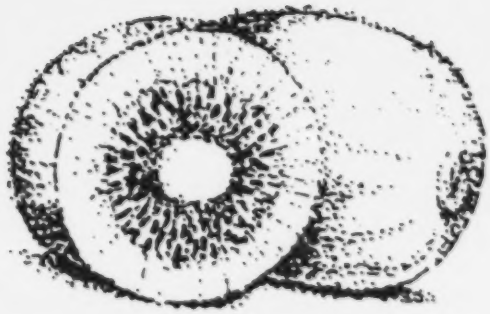
MARKETING

KIWIFRUIT

IN BRITISH COLUMBIA



Ministry of Agriculture & Food
Horticulture Marketing

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MARKETING KIWIFRUIT

IN

BRITISH COLUMBIA

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PREFACE

Following a strong demonstrated interest in kiwifruit by British Columbia fruit and vegetable producers of the South Coastal Region, extensive production information has been assembled by Brent Warner, Horticulturist at the B.C. Ministry of Agriculture and Food office in Saanichton. Research and field trials are conducted in conjunction with Agriculture Canada research staff. In order to provide some perspective on potentials and criterion in marketing kiwifruit in British Columbia, a terms of reference was prepared from which to develop a brief report which could be an additional useful reference. The headings of this terms of reference form the table of contents.

This assignment was given to Andrea Karen who was employed as Research Assistant during the summer of 1985. Jeanette Paige has transferred written draft to typewritten copy.

Comments and enquiries on marketing of kiwifruit are most welcome.

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MARKETING KIWIFRUIT IN BRITISH COLUMBIA

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I would like to thank the following people for their invaluable assistance in compiling this study. First of all, I would like to thank Brent Warner, District Horticulturist, South Coastal Region, B.C. Ministry of Agriculture and Food for the large amount of written material he made available to me as well as all the advice and assistance he gave me. Mark Housten, President of the California Kiwifruit Commission was also extremely helpful in sending me not only samples of promotional material but also much information on current marketing trends and future goals. He also provided data from the 1984 International Kiwifruit Organization Conference. Margaret Guy, of David Oppenheimer and Sons, Ltd. was invaluable in verifying and correlating price and volume data as was John Christiansen, Produce Merchandise Manager, Canada Safeway Ltd. Lastly, I would like to thank Paul Joyce, Research Officer, Agriculture Canada, who was not only very patient, but also very persistent in gathering data for me.

Andrea Karen
Research Assistant
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INTRODUCTION

Kiwifruit is a relatively new horticultural product on the international market and it has rapidly gained both acceptance and popularity. It is an elongated, oval fruit, approximately the size of a large egg. It has a brown fuzzy skin which is rather unattractive but when sliced open, reveals an emerald green flesh with an attractive pattern of small, black seeds around a light-coloured, soft core. The fruit is firm but juicy and has a refreshing, delicate tangy flavour. It has a low caloric content, is rich in vitamins and minerals and also contains the proteolytic enzyme actiniden which is a natural aid to digestion.

Kiwifruit is indigenous to the Yangtse Valley of China but was introduced into New Zealand in the early 1900's. The first commercial acreages were planted in New Zealand in the 1930's and the first export shipment was sent to London in 1953. California started planting commercial acreages in 1967 and is now the second largest producer of the more than fifteen known countries which have planted commercial acreages. Production is expected to increase dramatically as these plantings come into full bearing.

TRENDS IN WORLD PRODUCTION AND INTERNATIONAL TRADE

Kiwifruit production and exports have expanded rapidly in recent years both in volume and in the number of countries in production. New Zealand is still the largest producer and exporter while West Germany, Japan, the Netherlands and the United States are the major importers. The United States, France, Japan and Italy are major producers in the Northern Hemisphere while Greece, Australia, Chile, South Africa and Spain have commercial kiwifruit production to varying degrees.

Commercial production started in 1937 in New Zealand but the first export shipments were not made until 1953. At this time, approximately 160 tonnes were being produced in New Zealand and of this, 9 tonnes were exported. By 1963, production had more than doubled and export volume was approximately 45 tonnes. Growth has continued to escalate and in 1983, just thirty years after the first export shipment was sent, New Zealand produced 47,500 tonnes and exported over 80% of it or 39,000 tonnes. New Zealand's two largest markets are West Germany and Japan, both of which consumed 28% of the total shipments in 1983. This will likely change since Japan's production is increasing. New Zealand exports to some thirty other countries including the United States, Austria, France, Australia, Belgium, Scandinavia and the United Kingdon, to name a few. Due to the large increase in plantings in recent years, New Zealand is estimated to be producing 200,000 tonnes by 1988. Export volumes anticipated are as follows: 1985 - 70,000 tonnes, 1986 - 96,000 tonnes, and 1987, 130,000 tonnes.

California is currently the second largest producer of kiwifruit with an estimated production of 11,900 tonnes in 1983. This is a dramatic increase in production from the 1977 estimate, of just over 650 tonnes. California has seen tremendous growth since the first plantings were made in 1967. In 1983, their export volume was approximately 5,700 tonnes with Japan being the largest foreign market.

France is ranked as the third largest producer according to the 1984 International Kiwifruit Organization Conference estimates. In 1983, total production was 5,900 tonnes of which 3,600 tonnes were exported.

France's major markets are West Germany, the Netherlands and Belgium but shipments are also made to Italy, Austria, the United Kingdom and the Scandinavian countries.

Japan's production has been steadily increasing over the past several years and they are expected to decrease their reliance on imports which correspond with their growing season. In view of this, California is concentrating more on their domestic markets allowing Japan to supply its own market.

Italy is another major producer in the Northern Hemisphere and helps to supply its own market as well as West Germany, Austria, Switzerland, Denmark and France. Production continues to expand and diversification into processed products is being explored.

Australian production has increased significantly in the last few years and produced an estimated 1,050 to 1,225 tonnes in 1983, approximately equal to the amount they imported. A large number of plantings have not yet come into bearing and are expected to displace some imports when they do become productive.

Greece produces kiwifruit in limited export quantities but is restricted by the limited production of recently planted vines. The Netherlands are Greece's major foreign market where they face stiff competition from France and Italy.

Chile has recently planted large acreages and is expected to compete strongly with New Zealand once the plantings come into full production. South Africa, Spain, Portugal, Israel and Zimbabwe have also gone into production and had plantings of at least 30 hectares by 1984.

World production of kiwifruit is expected to continue to escalate as new plantings come into production and New Zealand will face increasing competition from other Southern Hemisphere countries. West Germany is expected to continue to be a large importer but with an increasing number of competitors on the world market, domestic market potential and diversification into processed products will play an ever important role.

TRENDS IN WORLD PRODUCTION OF KIWIFRUIT
1981-1984

	1981	1982	1983	1984	Forecast 1988
Total Production(MT)					
New Zealand	28,000	25,300	47,500	62,000	200,000
California	6,260	14,060	12,701	16,200	40,000
France	1,700	3,300	5,100	N/A	12,000
Italy	N/A	5,820	8,000	N/A	40,000
Japan	N/A	2,200	4,000	N/A	18,000
Australia	N/A	700	1,137	N/A	5,000
Greece	260	640	800	N/A	N/A
Chile	N/A	N/A	N/A	N/A	N/A
South Africa	N/A	6	N/A	N/A	N/A
Spain	N/A	N/A	N/A	N/A	N/A
Total	N/A	52,026	79,238	N/A	N/A

	1981	1982	1983	1984	Forecast 1988
Export Production(MT)					
New Zealand	21,746	16,388	36,429	51,000	130,000
California	3,000	5,700	5,700	N/A	N/A
France	1,600	2,120	3,600	N/A	N/A
Italy	N/A	3,000	4,000	N/A	N/A
Japan	N/A	N/A	N/A	N/A	N/A
Australia	N/A	68	N/A	N/A	N/A
Greece	80	100	100	N/A	N/A
Chile	N/A	N/A	N/A	N/A	N/A
South Africa	N/A	N/A	N/A	N/A	N/A
Spain	N/A	N/A	N/A	N/A	N/A
Total	N/A	27,376	49,829	N/A	N/A

EXPORTS OF FRESH KIWIFRUIT FROM NEW ZEALAND
1977 - 1983

Country of Destination	1977	1978	1979	1980	1981	1982	1983
		Met. Tons					
United States	835	494	854	1,303	1,924	1,730	4,047
Australia	456	396	495	572	897	1,088	1,414
Austria	30	85	207	565	821	886	2,247
Belgium	130	271	549	670	997	849	1,414
Canada	172	157	170	267	393	389	840
France	151	228	260	435	951	698	1,714
Germany, (Fed. Rep.)	1,687	2,485	6,861	5,852	7,412	4,408	10,452
Japan	1,681	2,394	3,326	3,341	5,432	4,126	10,297
Netherlands	94	339	593	269	609	418	839
Switzerland	61	101	138	204	323	365	487
Scandinavia	506	533	425	480	733	492	949
United Kingdom	52	64	199	391	652	346	858
Italy	0	0	0	0	312	250	602
Others	7	5	21	152	290	293	269
WORLD TOTAL	**5,862**	**7,552**	**14,098**	**14,501**	**21,746**	**16,338**	**36.429**

SOURCE:

1984 International Kiwifruit Organization Conference, Te Puke, New Zealand
1984 Produce Marketing Almanac Supplement, Produce Marketing Association Inc.
1984 Kiwifruit Monitoring Report, New Zealand Ministry of Agriculture and Fisheries

PRICING OF KIWIFRUIT

Kiwifruit is imported into British Columbia from New Zealand in the months of May through December and from California in the months of October through April. These seasons overlap slightly at present and are expected to overlap more as production and demand increase and storage capabilities improve. The price trend is clearly defined for the 33 to 39 count size and to a lesser degree for the 40 to 45 count size.

New Zealand is a major source of supply starting in May and continuing through December. At the beginning of the season, the landed import price is at its peak and gradually decreases through January. It then starts to rise again since British Columbia is then reliant on Californian kiwifruit. This trend is shown clearly in figure 1.

The initial price at the start of the New Zealand season is high, around $13.00 to $20.00* for a tray, due to the market premium paid for early produce, the high cost of air-freight, the lack of selection of other fresh fruit, and the limited supply of Californian kiwifruit from storage. As supply increases and is shipped by boat, price starts to decline. It continues to fall to approximately $10.00 to $11.00* per tray when California starts shipping because market supply is then maintained even though New Zealand supply is decreasing. The price only increases in December as New Zealand is no longer shipping and California has a limited supply in storage.

New Zealand supplies a greater portion of the British Columbian market and sets the price trends with respect to its season and influences the market even when it is not shipping as a result of the decreased supply. This may change in view of California's growing concentration on the North American market as international competition increases and new plantings come into production. At this time, California is a price-follower but with an estimated production of 50,000 tonnes by 1988, they are expected to be very aggressive on the North American market.

The price range for the size 33 to 39 count varies over the five year period within and between years. New Zealand prices range from $9.75 to $20.00* while California prices range from $5.50 to $20.00*. New Zealand kiwifruit was more expensive in 1982 than in any other year because the crop was badly damaged by a hailstorm at harvest time and production tonnage was subsequently less than expected. The years 1983 to 1985 have seen good crops from New Zealand and the landed import price has been gradually decreasing. California kiwifruit has commanded fairly regular prices of $10.00 to $15.00 per tray on the 33 to 39 count size with the exception of January and February in 1982. The range is wider in these months and can be attributed to a breakdown in storage facilities and subsequent, rapid ripening of the fruit.

*Estimated monthly average landed import price to Vancouver (Canadian dollars).

The price trends for kiwifruit landing in Vancouver are fairly regular. New Zealand exports a larger volume than does California and is therefore, the price setter. The regular pattern is for premium prices in late March through early June due to the decrease of Californian supplies and limited New Zealand supply. After this period, prices steadily decline with a low in December to January before picking up again. Prices seem to be showing a slight trend of decreasing each year. This can be attributed to increased production and a supply more equal to demand.

LANDED IMPORT PRICE OF KIWIFRUIT INTO VANCOUVER
IN CANADIAN FUNDS, FOR 1981-1985
33-39 COUNT

N.Z. .....

CAL *********

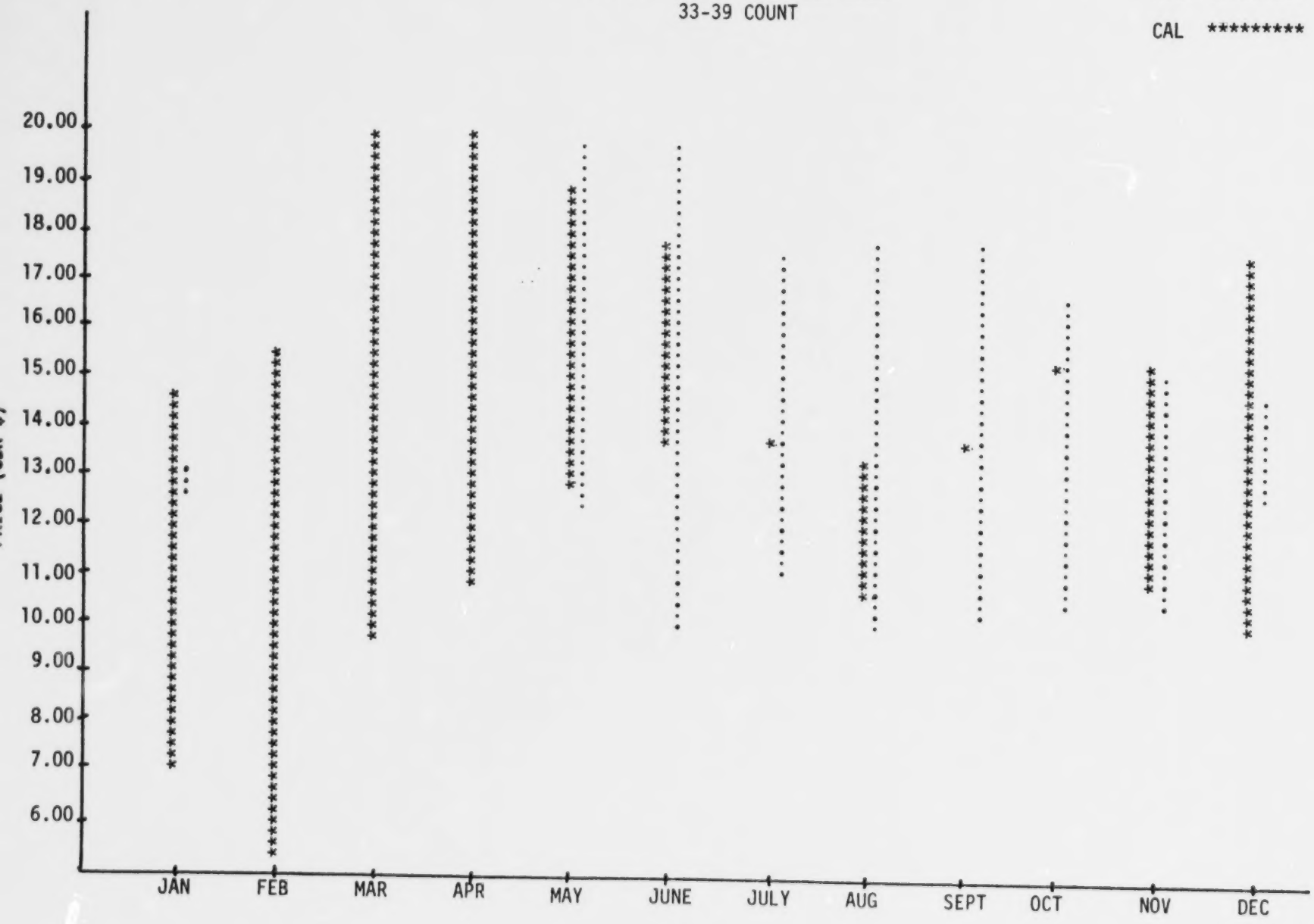


Figure 1

LANDED IMPORT PRICE OF KIWIFRUIT INTO VANCOUVER
IN CANADIAN FUNDS, FOR 1981-1985

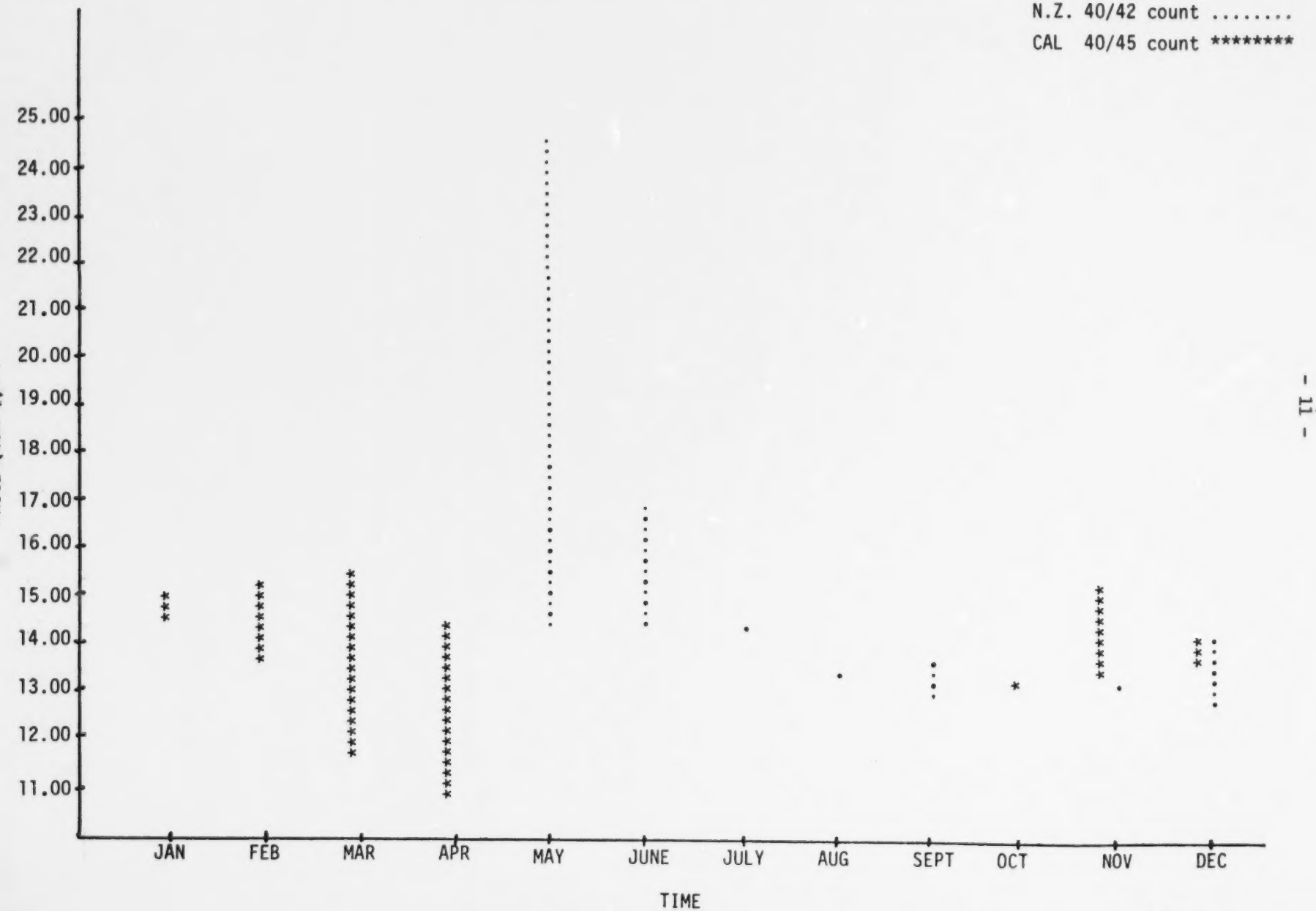


Figure 2

LANDED IMPORT PRICE OF KIWIFRUIT INTO VANCOUVER
IN CANADIAN FUNDS, FOR 1981-1985

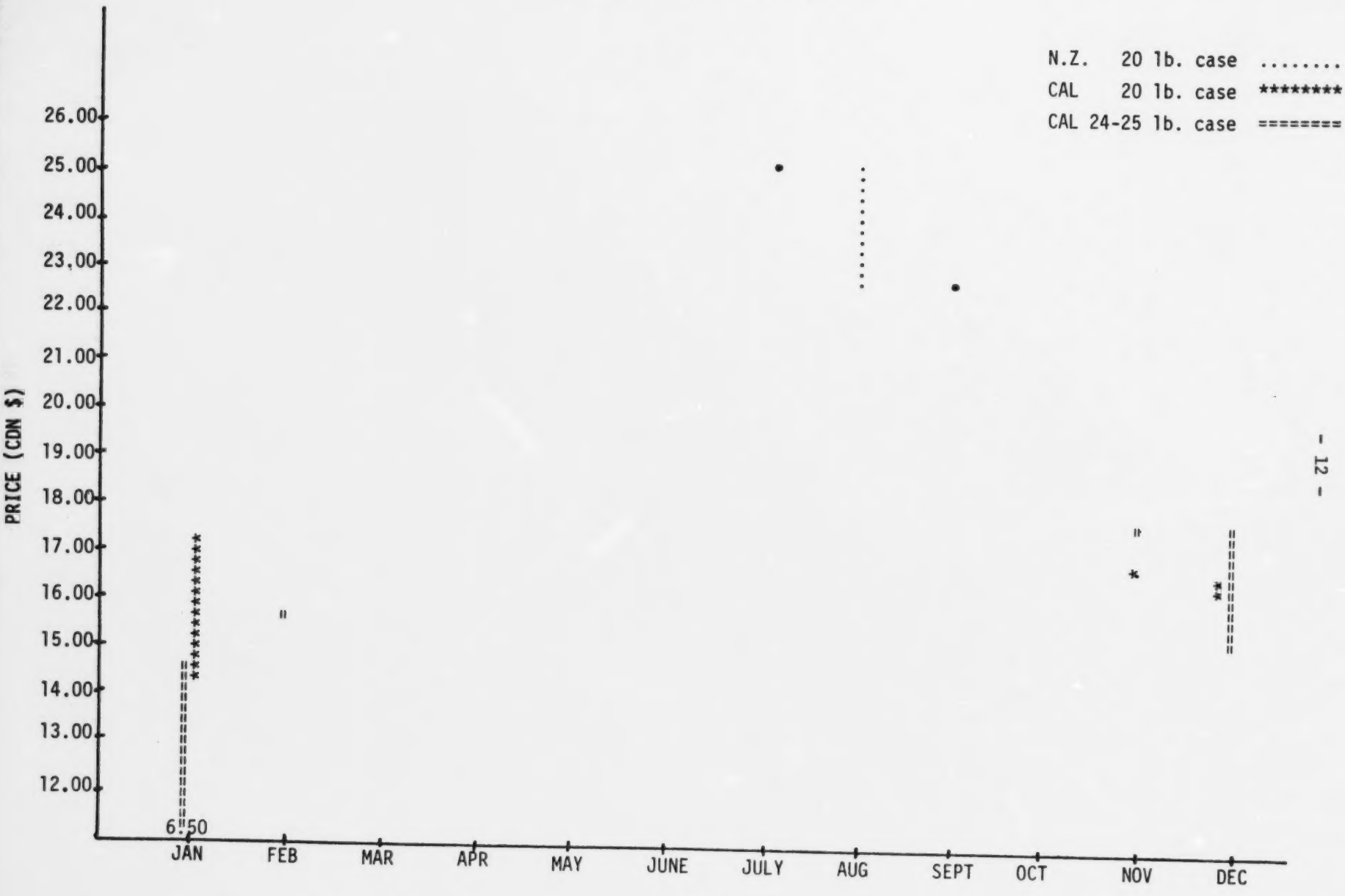


Figure 3

ESTIMATED AVERAGE LANDED IMPORT PRICE OF KIWIFRUIT
TO VANCOUVER FOR 1981 - 1985

	NEW ZEALAND				CALIFORNIA				
1981	25 COUNT	33/39 COUNT	40/42 COUNT	20 LB	25 COUNT	33/39 COUNT	40/45 COUNT	20 LB	24/25 LB
JAN	-	-	-	-	14.00	-	15.00	-	-
FEB	-	-	-	-	-	-	14.50	-	-
MAR	-	-	-	-	-	19.75	14.50	-	-
APR	-	-	-	-	-	20.00	14.50	-	-
MAY	-	-	14.50-24.75	-	-	-	-	-	-
JUN	-	14.25	14.50-17.00	-	-	-	-	-	-
JUL	-	14.25	14.50	-	-	-	-	-	-
AUG	-	14.25-17.25	13.75	-	-	-	-	-	-
SEP	-	-	13.00-13.75	-	-	-	-	-	-
OCT	-	13.75	-	-	-	15.25	13.50	-	-
NOV	-	13.75	13.50	-	-	13.25-15.25	13.75-15.75	-	-
DEC	-	14.50	13.00-14.50	-	-	17.25	14.00-14.50	-	-

	NEW ZEALAND				CALIFORNIA				
1982	25 COUNT	33/39 COUNT	40/42 COUNT	20 LB	25 COUNT	33/39 COUNT	40/45 COUNT	20 LB	24/25 LB
JAN	-	13.00	-	-	-	7.00-14.50	14.50		
FEB	-	-	-	-	-	5.50-15.25	13.75-15.25	-	-
MAR	-	-	-	-	-	14.00-14.25	13.50	-	-
APR	-	-	-	-	14.00	14.00	-	-	-
MAY	14.00-20.00	20.00	20.00	-	-	-	-	-	-
JUN	-	17.00-20.00	-	-	-	-	-	-	-
JUL	-	17.00-17.25	-	-	-	-	-	-	-
AUG	-	15.50-17.75	-	-	-	-	-	-	-
SEP	-	16.50-17.75	-	-	-	-	-	-	-
OCT	-	15.25-16.25	-	-	-	-	-	-	-
NOV	-	13.00-15.00	-	-	-	-	-	16.75	17.75
DEC	-	12.50-13.50	-	-	-	-	-	16.50-16.75	-

	NEW ZEALAND				CALIFORNIA				
1983	25 COUNT	33/39 COUNT	40/42 COUNT	20 LB	25 COUNT	33/39 COUNT	40/45 COUNT	20 LB	24/25 LB
JAN	-	12.50	-	-	-	10.25-12.50	-	14.25-16.50	-
FEB	-	-	-	-	-	9.75-10.50	-	-	-
MAR	-	-	-	-	-	9.75-14.75	-	-	-
APR	-	-	-	-	-	15.50-15.75	-	-	-
MAY	-	15.50-17.00	-	-	-	-	-	-	-
JUN	-	13.00-15.00	-	-	-	-	-	-	-
JUL	-	12.25-12.50	-	-	-	-	-	-	-
AUG	-	11.50	-	22.50	-	-	-	-	-
SEP	-	11.50	-	22.50	-	-	-	-	-
OCT	-	11.50	-	-	-	-	-	-	-
NOV	-	11.50	-	-	-	10.50-10.75	-	-	-
DEC	-	-	-	-	-	10.00-10.25	-	-	-

1984	NEW ZEALAND 25 COUNT	33/39 COUNT	40/42 COUNT	20 LB	CALIFORNIA 25 COUNT	33/39 COUNT	40/45 COUNT	20 LB	24/25 LB
JAN	-	-	-	-	-	9.75-12.00	-	-	-
FEB	-	-	-	-	-	11.00-12.50	-	-	-
MAR	-	-	-	-	-	12.00-13.00	-	-	-
APR	-	-	-	-	-	13.50-17.00	-	-	-
MAY	-	13.75	-	-	-	16.00-19.25	-	-	-
JUN	-	13.50-14.75	-	-	-	13.50-18.00	-	-	-
JUL	-	11.50-13.50	-	25.75	-	13.50	-	-	-
AUG	-	10.25-11.50	-	25.75	-	10.50-13.00	-	-	-
SEP	-	10.25-10.75	-	-	-	13.00	-	-	-
OCT	-	10.25-11.00	-	-	-	-	-	-	-
NOV	-	10.25-10.50	-	-	-	12.00-12.75	-	-	17.75
DEC	-	-	-	-	-	9.00-12.75	-	-	15.50-17.75

1985	NEW ZEALAND 25 COUNT	33/39 COUNT	40/42 COUNT	20 LB	CALIFORNIA 25 COUNT	33/39 COUNT	40/45 COUNT	20 LB	24/25 LB
JAN	-	-	-	-	-	11.00-13.50	-	-	-
FEB	-	-	-	-	-	12.00-15.50	-	-	-
MAR	-	-	-	-	-	12.00-16.00	11.75-15.50	-	-
APR	-	-	-	-	-	11.00-15.75	11.00-13.00	-	-
MAY	-	12.75-14.25	-	-	-	13.00-14.00	-	-	-
JUN	-	10.00-13.25	-	-	-	-	-	-	-
JUL	-	11.00-12.25	-	-	-	-	-	-	-
AUG	-	9.75-11.00	-	-	-	-	-	-	-
SEP									
OCT									
NOV									
DEC									

RANGE OF 1981 - 1985 LANDED IMPORT PRICES
OF KIWIFRUIT TO VANCOUVER

	NEW ZEALAND 25 COUNT	33/39 COUNT	40/42 COUNT	20 LB	CALIFORNIA 25 COUNT	33/39 COUNT	40/45 COUNT	20 LB	24/25 LB
JAN	-	12.50-13.00	-	-	14.00	7.00-14.50	14.50-15.00	14.25-17.25	6.50-14.75
FEB	-	-	-	-	-	5.50-15.50	13.75-15.25	-	15.50
MAR	-	-	-	-	-	9.75-19.75	11.75-15.50	-	-
APR	-	-	-	-	14.00	11.00-20.00	11.00-14.50	-	-
MAY	14.00-20.00	12.75-20.00	14.50-24.75	-	-	13.00-19.25	13.00-19.25	-	-
JUN	-	11.00-20.00	14.50-17.00	-	-	13.50-18.00	-	-	-
JUL	-	11.00-17.25	14.50	25.75	-	13.50	-	-	-
AUG	-	9.75-17.75	13.75	22.50-25.75	-	10.50-13.00	-	-	-
SEP	-	10.25-17.75	13.00-13.75	22.50	-	13.00	-	-	-
OCT	-	10.25-16.25	-	-	-	15.25	13.50	-	-
NOV	-	10.25-15.00	13.50	-	-	10.50-15.25	13.75-15.75	16.75	17.75
DEC	-	12.50-14.50	13.00-14.50	-	-	10.00-17.25	14.00-14.50	16.50-16.75	15.50-17.75

SOURCE:

Selected wholesalers and brokers
Agriculture Canada

VANCOUVER WHOLESALE SALES VOLUME

1984 - 1985

New Zealand and California supply all of the Vancouver kiwifruit market at the present time. New Zealand supplies more than two-thirds of the market on a yearly basis with most of the supply in the period of June through October. California starts shipping at the end of October and continues until April. Increasingly efficient handling and storage practices will lengthen both these marketing seasons.

At present, not very much is known about the demand curve for kiwifruit in Vancouver. This is due to the fact that the Unloads data has not been monitored consistently and therefore does not represent total sales of kiwifruit on the Vancouver Wholesale market. From the data available, it appears current monthly sales could be in the 130,000 to 150,000 pounds per month range with considerably higher consumption at certain periods in July and August. It appears that there is additional potential for good quality kiwifruit at a reasonable price. If world production continues to increase as dramatically as it has done, competition for the North American market will increase and prices will fall. At the same time, some diversification will be necessary to avoid saturating the market and also to utilize inferior quality fruit. This will alter the sales volume pattern and will smooth out some of the surpluses and shortages.

There appears to be potential for good quality kiwifruit as evidenced by peak sales volumes during July and August when large volumes are available, but limited information is available at this time and the sales volumes are not very accurately known. These patterns will likely shift as world production increases and demand is met.

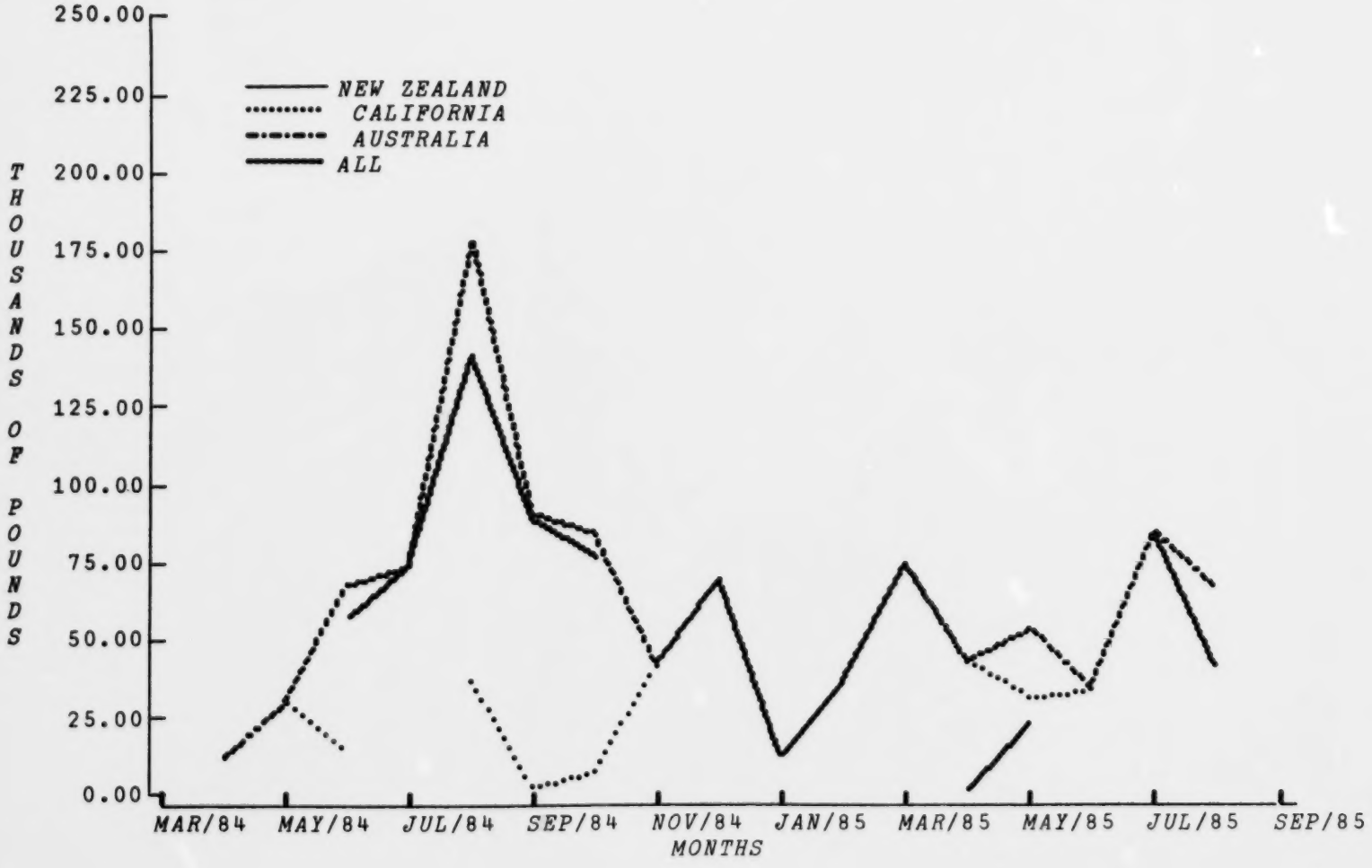
VANCOUVER WHOLESALE SALES VOLUME
OF KIWIFRUIT FOR 1984 - 1985
('000 LBS.)

	1984			1985		
	NEW ZEALAND	CALIFORNIA	TOTAL	NEW ZEALAND	CALIFORNIA	TOTAL
JAN			*	-	12	12
FEB			*	-	53	53
MAR			*	-	57	57
APR	-	11	11	1	42	43
MAY	-	29	29	22	31	53
JUN	55	12	67	-	34	34
JUL	73	-	73	125	-	125
AUG	140	37	177	21	4	25
SEP	86	2	88	N/A	N/A	N/A
OCT	75	9	84	128	18	146
NOV	-	39	39			
DEC	-	69	69			
TOTAL	429	208	637			

* Data unavailable

SOURCE:
Agriculture Canada

KIWIFRUIT UNLOADS TO THE VANCOUVER WHOLESALE MARKET
BY SOURCE
FOR 1984 * 1985



PACK SPECIFICATIONS OF KIWIFRUIT

Kiwifruit from both New Zealand and California are packed in single layer wooden or cardboard trays with pre-formed plastic inserts. These hold approximately 3.5 kilograms of fruit in a tray with approximate dimensions of about 5 centimeters deep by 29 centimeters by 46 centimeters. The trays are individually wrapped with a sheet of light polyethylene to protect against moisture loss and corrugated boards are placed between trays to cushion the fruit. Each tray is marked on the end with the fruit count, the variety and the grower's registered mark. Trays with the same count are strapped together, usually in threes, onto a pallet for loading into shipping containers. New Zealand and California differ slightly in their count sizes. New Zealand packs trays with count sizes 25, 33, 32/36, 33/36, 32/42, 36, 36/39, 38, 38/42, 39, 40, 42 and 46. California packs trays with count sizes 25, 28, 30/39, 33, 33/42, 33/45, 35, 36, 38, 40, 42, 44/45.

Some export fruit is "jumble-packed" into 0.03 metre cubed wooden cases for bulk shipment and is repacked into consumer units when it reaches its destination. As well, both New Zealand and California pack a bulk nine kilogram carton and California also packs cartons of 18, 20 and 24 .45 kilogram polyethylene bags.

HANDLING, PACKING, AND TRANSPORTATION OF KIWIFRUIT

HANDLING

Kiwifruit are picked when still firm at a minimum level of soluble solids. They are allowed to ripen and soften in storage in much the same way as pears are ripened. Kiwifruit are hand-picked into soft canvas bags which are worn apron-style. Apple picking bags are also used.

Picked fruit is transferred from the canvas bags to large wooden bins and is sent either to cool storage or to a packing line. It is cooled as soon as possible to remove the field heat which would otherwise shorten the storage life considerably.

Kiwifruit are sorted by hand at first and all fruit which is not clean, sound, blemish, pest or disease-free is removed. The fruit is then passed through a mechanical sizer which sizes by weight.

After sizing, the fruit is packed either manually or mechanically into trays or polyethylene bags. The trays are then individually wrapped with a sheet of light polyethylene and a sheet of corrugated cardboard is placed between the trays for cushioning. Each tray is stamped on the end with the count of fruit, the variety and the grower's registered mark. Trays with the same count are strapped together, usually in threes, by either metal strapping or with a stretchable plastic mesh. All packaging is well ventilated for rapid cooling when the fruit is placed in cold storage.

STORING

Kiwifruit has good keeping quality but storage life does vary with both the variety and the soluble solids level. Kiwifruit can be kept for at least four months in cold storage and up to two months longer in controlled atmosphere storage.

The fruit should be evenly mature and in good condition. It should have the field heat removed immediately after harvest by pre-cooling to zero degrees centigrade to lower respiration and reduce aging. The fruit will freeze at temperatures below -1.5 degrees centigrade and is then unmarketable. Relative humidity should be kept as close to 95% as possible to reduce shrivelling and weight loss. The fruit must also be protected from exposure to ethylene which will cause it to ripen prematurely and thereby, shorten its storage life. Under these conditions, kiwifruit will keep for at least four months.

Controlled atmosphere storages have been found to extend the storage life of kiwifruit by up to two months. The best atmosphere is one with 2% Oxygen and 5% Carbon Dioxide, while the same conditions of temperature, relative humidity and the exclusion of ethylene as for conventional storage are maintained. The fruit will keep firm for six months with good storage and will still have a good shelf life.

TRANSPORT

New Zealand air freights its first kiwifruit shipment of the season and sends subsequent shipments by boat. California sends its shipments by either track or boat, depending on the location of the market.

There are two very effective types of shipping containers; a forced ventilated type and a modified atmosphere type. The forced ventilated type is a general purpose cargo container with an electric fan added. This fan pulls in outside air, circulates it and pushes it out side vents, effectively replacing the need for refrigeration. The modified atmosphere container is only effective for short trips of less than four weeks. It operates by controlling the nitrogen, oxygen, carbon dioxide, temperature, and relative humidity to reduce the respiration rate of the fruit.

Kiwifruit withstands transit well when good containerization methods are used and quality can be maintained through the four to six week transit period for distant markets.

STORAGE DISEASES AND DISORDERS

Kiwifruit is susceptible to only a few disorders and diseases in storage. The most potentially serious problem is Botrytis gray mold rot. This disease, as with Alternaria surface mold, Phomopsis rot and blue mold, is closely associated with the condition of the fruit and most likely to appear when the fruit is almost ripe. Other disorders which may appear in storage are freezing damage, shrivelling and premature ripening.

Botrytis gray mold rot is characterized by aerial mycelium which grow out of infected fruit and contact nearby fruit, causing them to rot. This mycelium may be white or gray and sometimes the surface of the fruit blackens. This disease is primarily active when the fruit is almost ripe. Control of this disease is mainly aimed at field sprays during the season but a postharvest fungicidal treatment of Botran is available in a wax formulation. This should reduce infections originating in handling wounds or from contact with adjacent infected fruit.

Alternaria surface mold is a marketing problem since it detracts from the fruits appearance. This disease is contacted at blossom but remains dormant until the high storage humidity activates the fungus. It is characterized by fungal growth on the surface and at the blossom end. It can be controlled by removing any adhering floral parts before storage or by using orthophenylphenate (OPP) as a postharvest fungicidal treatment.

Phomopsis rot is a stem-end rot which develops in storage and is a potential source of loss. It is a field disease, which may remain dormant until the fruit is nearly ripe. At this point, the stem-end of the fruit becomes very soft and exudes fruit juice. There is no effective post-harvest treatment for this disease at present.

Blue mold is a secondary infection which contributes to fruit rot. It enters through wounds originating in harvesting or handling and becomes apparent when the fruit is almost ripe.

Kiwifruit suffers freezing damage at temperatures of below -1.5 degrees centigrade. This damage is evidenced by a softening and a wateriness of the fruit which render it unmarketable. Storage temperatures should be monitored carefully to avoid this problem.

Kiwifruit is subject to fruit shrivelling and weight loss when stored at humidities much below 95%. This represents a proportionate loss over time so any fall in humidity should be quickly adjusted.

Premature ripening is caused by exposure to ethylene gas from other fruit or from machinery and is evidenced by rapid fruit softening. Other fruit, especially apples and pears should be kept completely separate from kiwifruit and only electric forklifts and other machinery should be used in kiwifruit handling.

These diseases and disorders are all potential sources of loss but through good production and handling practices, can be minimized.

METHODS OF UTILIZATION OF KIWIFRUIT

Kiwifruit is mostly consumed as a fresh product at this time but as production increases and market standards are defined and enforced, other methods of utilization are being investigated.

Kiwifruit can be enjoyed fresh in appetizers, salads, main courses, desserts, snacks and drinks. Kiwifruit can be made into a fruit soup, added to seafood or fruit cocktails or used as a garnish. It can be used in a mixed fruit salad, added to a cottage cheese plate or a raw vegetable platter. Kiwifruit can be included with main courses such as schnitzel, veal casseroles, sauce for pork or lamb chops or kabobed with lamb cubes. Kiwifruit is a natural dessert on its own or as a filling for fresh fruit tarts or pies, in chocolate fondues, battered and fried as kiwifruit fritters, made into or added to ice creams, sliced into cream or custard, used as a garnish for cheesecakes, sponges, pavlovas and other cakes, or flamed with rum or brandy. As a snack, kiwifruit is tasty rolled in a slice of ham or salami, topped with melted cheese on toast, or just sliced with cheese in a bread roll. Kiwifruit is also the perfect accompaniment when sliced in a fruit cup or can be used as an attractive garnish for mixed drinks.

The processing of kiwifruit has great possibilities both in order to keep sub-grade fruit off the fresh market and to diversify the market. Some of these have been quite successful. Kiwifruit liqueurs and wines are being marketed as well as jams, dried kiwifruit "chips", kiwifruit leathers, and kiwifruit juices. Kiwifruit can also be frozen successfully and it retains

its colour, texture and nutritional composition. Canned kiwifruit changes slightly in colour and flavour but still retains its nutrient status. Kiwifruit juice has potential since it may be blended with other juices or consumed as a single-strength juice and has a vitamin C concentration more than twice that of oranges as well as being very flavourful.

Actiniden is a compound in kiwifruit which has valuable properties as a meat tenderizer and has been successfully extracted although commercial production is not yet realized.

Kiwifruit is a versatile fruit which can be used in a variety of ways, both fresh and processed, many of which will be expanded on as production increases.

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SAMPLE COSTS OF PRODUCTION

BRITISH COLUMBIA

NOTE: Assumptions are based on a three acre project established by the New Crop Development Fund in conjunction with the B.C. Ministry of Agriculture and Food and the Saanich Peninsula Farmers' Institute.

The sample cost of production is made over a five year period on a three acre planting but the assumptions are made on a per acre basis for simplicity of comparison with other operations.

Land: is assumed to be rented at $200.00 per acre per year.

Land Preparation: $530 per acre in the establishment year to subsoil, plow, and disc.

Hedging: - plants - Lombardy poplar planted four feet apart on the windward side only would require 56 plants at a cost of $2.50 each. Planting costs $1.50/each.

112 plants/acre x ($2.50/each + $1.50/each = $448.00/acre

- fence - plastic fencing used as an alternative to Lombardy poplar for 122 feet per acre, cost is $495 per acre.

Plants: 400 plants per acre x $13 per plant = $5,200 per acre

Labour and Maintenance: planting and training costs establishment year = $530 per acre.

- Year 1 = $1,000
- Year 2, 3, 4 = $600

Posts, Wire and Tighteners: see figures 4 and 5

Irrigation Equipment: trickle irrigation system with PVC pipe and two spray nozzles per plant = $2,000

Soil Analysis: routine analysis and boron and sulphate sulphur and micronutrient cations = $25.00

Vine Ties: Max tape gun per acre = $ 56
Tape supply per acre = $110
$166

Fertilizer: 34-0-0 three to four times per season at two to four ounces per feeding = $135.00

Herbicide: Gramoxone at $70/4L
Roundup at $275/10L
= $120.00

Seed Mix: Alka perennial rye grass at $89/20 kg
Hard fescue at $60/20 kg
= $33.00

Hive Rental: 3 hives per acre x $30 per hive = $90.00

Irrigation: power and lub: gas powered irrigation equipment

Hired Labour: part time technician

Taxes and Water: Land $20.00/acre
Water $60.00
$80.00

COSTS TO ESTABLISH A 3 ACRE KIWIFRUIT VINEYARD IN BRITISH COLUMIBA

	Est.Year	Year 1	Year 2	Year 3	Year 4
CASH COSTS					
CROP EXPENSES					
LAND RENTAL	600	600	600	600	600
LAND PREPARATION	1600				
HEDGING PLANTS	1344				
APPLE PICKING BAGS				675	
PLANT COST	15600				
LABOUR & MAINT. - planting, training	1600	3000	1800	1800	1800
POSTS	5682				
WIRE	1200				
PERGOLA ANCHOR ETC.	900				
IRRIGATION EQUIP.	6000				
MATURITY TESTING EQUIP.				400	
SOIL ANALYSIS	25	25			
VINE TIES		500			
FERTILIZER	405	205	205	205	205
PEST CONTROL	150	150	150	150	150
HERBICIDE	360	360	360	360	360
SEED MIX	100				
HIVE RENTAL				90	90
PACKING TRAYS				1125	1125
MACH & EQUIP COST					
FUEL	30	30	25	25	25
IRRIG. POWER & LUBE	150	150	150	150	150
LABOR - PICKING HARVEST				600	600
TAXES & WATER	80	80	80	80	80
MISCELLANEOUS	405	405	405	405	405
TOTAL CASH OUTFLOW	36231	5505	3775	6065	5590

COSTS OF ESTABLISHING AND PRODUCING KIWIFRUIT
SACRAMENTO VALLEY - 1982

Bill Olson & Kathleen Kelley, Butte County
Bill Krueger, Glenn County
David Chaney & Janine Sabaloni, Sutter-Yuba County
Joe Osgood, Tehama County
James Beutel, Extension Pomologist, UCD
Lynn Horel, Staff Research Assoc., Ag. Econ. Dept., UCD

This study is based on a 10-acre kiwifruit vineyard, 15' x 20' (145 vines per acre). The 10 acres of actual kiwifruit are assumed to be 660' x 660' square with a total of 1,452 plants, 44 rows with 33 vines per row. The vineyard is assumed to be owner-operated and to consist of 12 total acres allowing for 10 acres of actual plants with the remainder used for roads, farm shop, etc. The following assumptions will help to explain the study:

1. All labor costs $5.00/hr., which includes fringe benefits.

2. The T-bar trellis system is used. The cost for the trellis is detailed on a separate page.

3. Hired management may be required for absentee owners and large vineyards. For a 10-acre vineyard it is assumed that the owner is the manager and supplies part of the labor. Costs are shown as if all labor were hired.

4. Windbreaks are assumed to be used in some vineyards. If they are desired, they may consist of poplar trees planted 3 feet apart as an outside row on the windward side or sides of the vineyard. The cost is about $100 for planting a single row of poplar cuttings on one side of a 10-acre vineyard. A windbreak may be needed in the center if the wind is severe or on more than one side. Each 660 feet of windbreak would cost about $100. Using bare root or container grown trees from a nursery could cost from $400 to $600 per row.

5. Although cash receipts are displayed and used for calculations in the same year as the crop is harvested, it should be noted that payment is usually not received until the following year.

6. The irrigation system is a dual system using overhead sprinklers for frost control and drip irrigation for irrigating young vines. Cost details are on a separate page. The cost of pumping water is $25/acre foot. Water is applied as follows:

   4 ac. ft. in year 1
   5 ac. ft. in year 2
   6 ac. ft. in year 3 and following years

7. Pruning and training is performed as follows: dormant pruning in December and January; summer pruning, training and tying canes during June-September.

	Per Acre		
	Dormant Prune	Train & Tie	Materials
Year 1	-----	20 hrs.	$10
Year 2	5 hrs.	25 hrs.	$10
Year 3	24 hrs.	40 hrs.	$15
Year 4	48 hrs.	50 hrs.	$20
Full Bearing	145 hrs.	150 hrs.	$30

8. Mowing for weed control is performed as follows:

   Years 1, 2, 3, 4: 10 times -- Each time takes 4 hrs./10 ac.
   or 4 hrs./ac. of man and tractor per year.

   Full Production: 8 hrs./ac. with addition of swing mowing.

9. Fertilizer -- Cost of 35¢/lb. for nitrogen -- urea or equivalent. Application requires 1 hour per acre of labor.

   Year 1 -- None
   Year 2 -- 1/4 lb. nitrogen/vine split in 3 applications
   Year 3 -- 1/2 lb. nitrogen/vine split in 2 applications
   Year 4 -- 1 lb. nitrogen/vine split in 2 applications
   Mature -- 200 lbs. nitrogen/acre split in 2 applications

This study represents typical costs and operations for the Sacramento Valley area. Industry averages have not been used. In particular, trellis and irrigation systems and their associated investment costs vary widely. It is extremely important to point out that the costs for these two items will be incurred in the first year of establishing the vineyard. In this study these two items were assumed to be financed. Costs associated with the purchase of them is represented as investment costs of depreciation and interest. It is possible, and may be more appropriate in some cases, to include these costs as pre-harvest cash costs.

SAMPLE COSTS TO PRODUCE KIWIFRUIT

Sacramento Valley County - Date: 1982

Production Data: Yield - 8 tons (2285 trays) of packed fruit per acre.
Labor - @ $5.00/hr. including fringes.

Operation	Hours Per Acre	Cash and Labor Cost per Acre				
		Labor	Fuel & Repairs	Materials Kind & Quantity	Cost	Total
Cultural Costs:						
Pre-emergence herbicide	1	5.00		materials	55.00	60.00
Hand weed	7	35.00				35.00
Pest control				mat. & appl.	50.00	50.00
Fertilize	1	5.00		200 lbs N @ 35¢	70.00	75.00
Dormant prune	145	725.00				725.00
Summer prune & Tie	50	250.00		materials	30.00	280.00
Brush removal		2.00	3.00			5.00
Mow	8	40.00	48.00			88.00
Irrigate & frost control	5	25.00		power to pump 6 ac. ft. @ $25	150.00	175.00
Bees: 2 hives @ $10					20.00	20.00
Repairs					40.00	40.00
Misc. labor & materials					35.00	35.00
Interest on operating capital (1/2 yr @ 16%)					127.00	127.00
TOTAL CULTURAL COSTS:		1087.00	51.00		577.00	1715.00
Harvest Costs:						
Pick (75-80% packout)				20,000 lbs. @ 2½¢	500.00	500.00
Haul				10 tons @ $5.00	50.00	50.00
Pack & store				2285 trays @ $3.30	7540.00	7540.00
Forklift	3	15.00	18.00			33.00
Selling charges				2285 trays @ $1.00	2285.00	2285.00
TOTAL HARVEST COSTS:		15.00	18.00		10,375.50	10,408.50
Cash overhead:						
Misc., office, etc.					962.50	962.50
Taxes					252.00	252.00
TOTAL CASH OVERHEAD:					1214.50	1214.50
TOTAL CASH COST:		1102.00	69.00		12,167.00	13,338.00

Sample Costs to Produce Kiwifruit (cont'd.)

INVESTMENT:	Per Acre	Annual Cost Depreciation	Annual Cost Interest @ 14%	
Land	$ 8,500		$1,190	
4 yr. old vines	$21,716	$ 724	$1,520	
Irrigation system pump, OH sprinker & drip	$ 4,200	$ 280	$ 294	
Equip. & Buildings	$ 5,742	$ 591	$ 402	
Trellis	$ 1,612	$ 107	$ 113	
TOTAL:	$41,770	$1,702	$3,519	$ 5,221.00
TOTAL COST PER ACRE:				$18,459.00

COSTS TO ESTABLISH KIWIFRUIT VINEYARD

Sacramento Valley - 1982

	Costs Per Acre			
	1st Year	2nd Year	3rd Year	4th Year
Yield: 7-lb. trays per acre	--	--	--	500
Pre-Harvest Cash Cost:				
Contract Land Level	110.00	--	--	--
Contract Ripping	300.00	--	--	--
Fumigation: Mat. & Appl.	400.00	--	--	--
Pre-Emergence Herbicide, 5' wide	--	60.00	60.00	60.00
Stake & Layout	100.00	--	--	--
Install Trellis: $1.50/post	225.00	--	--	--
Install Wire: 24 hrs. labor	120.00	--	--	--
Vines: 145 @ $10(7 replants 2nd yr.)	1,450.00	70.00	--	--
Contract Plant: @ 50¢/vine ($1.00/vine 2nd yr.)	72.50	7.00	--	--
Handweed 3x: 36 hrs, 1st yr.	180.00	--	--	35.00
Dormant Prune:	12.50	25.00	120.00	240.00
Train, Tie, Sucker	110.00	135.00	215.00	270.00
Brush Removal	--	--	--	5.00
Mow	44.00	44.00	44.00	44.00
Irrigation (frost control):				
Pumping Power	100.00	125.00	150.00	150.00
Labor	25.00	25.00	25.00	25.00
Fertilize: mat. & appl.	--	17.60	30.20	55.75
Bees: 2 hives @ $10	--	--	20.00	20.00
Misc. labor & materials	30.00	30.00	30.00	30.00
Taxes, real & pers. Property	185.00	185.00	185.00	185.00
Repairs	40.00	40.00	40.00	40.00
Office & Business Costs	280.00	61.00	74.00	93.00
Interest on Operating Capital	303.00	66.00	80.00	100.00
Pre-Harvest Cash Costs:	4,087.00	890.60	1,073.20	1,352.75
Harvesting Costs:				
Pick	--	--	--	87.50
Haul	--	--	--	22.50
Forklift Use	--	--	--	16.50
Pack & Store	--	--	--	1,650.00
Selling Charges	--	--	--	500.00
Total Harvesting Costs:	--	--	--	2,276.50
TOTAL CASH COSTS:	4,087.00	890.60	1,073.20	3,629.25
Depreciation:				
Trellis	107.00	107.00	107.00	107.00
Irrigation System	280.00	280.00	280.00	280.00
Buildings & Equipment	591.00	591.00	591.00	591.00
TOTAL DEPRECIATION:	978.00	978.00	978.00	978.00

Costs to Establish Kiwifruit Vineyard (cont'd.)

	1st Year	2nd Year	3rd Year	4th Year
Interest on Investment @ 14%:				
Trellis	113.00	113.00	113.00	113.00
Irrigation System	294.00	294.00	294.00	294.00
Buildings & Equipment	402.00	402.00	402.00	402.00
Land	1,190.00	1,190.00	1,190.00	1,190.00
Interest on Accumulated Costs	--	989.00	1,669.00	2,470.00
Total Interest on Investment:	1,999.00	2,988.00	3,668.00	4,469.00
TOTAL COST FOR THE YEAR:	7,064.00	4,856.60	5,719.20	9,076.25
Credit for Fruit @ $10/Tray	--	--	--	5,000.00
NET COST FOR THE YEAR:	7,064.00	4,856.60	5,719.20	4,076.25
ACCUMULATED NET COST:	7,064.00	11,920.60	17,639.80	21,716.05

EQUIPMENT INVESTMENT FOR KIWIFRUIT PRODUCTION

Sacramento Valley - 1982

ITEM	COST	YEARS LIFE	ANNUAL DEPRECIATION
Tractor, 50 HPWD*	$16,000	10	$1,600
Mower, Rotary	$ 6,000	10	$ 600
Weed Sprayer, PTO used	$ 2,000	10	$ 200
Front End Forklift Attachment	$ 4,000	10	$ 400
Tape Guns, 2 @ $40 each	$ 80	5	$ 16
Picking Bags, 6 @ $20 each	$ 120	5	$ 24
Farm Shop	$15,000	20	$ 750
Pickup	$ 9,000	5	$1,800
Misc. Equipment	$ 5,220	10	$ 522
			$5,912

TOTAL INVESTMENT: $57,420

Per Acre on 10 acres $ 5,742

Depreciation per acre $ 591

Interest per acre $ 402

*For smaller acreages, a smaller tractor could suffice.

FIRST YEAR IRRIGATION SYSTEM AND TRELLIS INVESTMENT - KIWIFRUIT

Sacramento Valley - 1982

ITEM	COST	COST PER ACRE	YEARS LIFE	DEPRECIATION	INTEREST
IRRIGATION SYSTEM: (dual system)					
(1) Sprinkler (overhead frost control system)					
Pump 30 hp turbine (installed)	9,000.00	900.00			
Well	6,000.00	600.00			
PVC, mainline, etc. (installed)	18,000.00	1800.00			
(2) Drip	5,000.00	500.00			
Pump 4 hp submersible	4,000.00	400.00	15	280.00	294.00
TOTAL COST:	42,000.00	4200.00			
TRELLIS: (for 10 acres)					
(1) Treated Posts: 5", 9' notched, 1,496 @ $5.85 each	8,751.60				
(2) Bolts, Nut & Washers, Drill Holes: 1,496 @ $60¢ each	897.60				
(3) Deadman Assembly: either rebar, cement & anchor, OR, post & earth anchor 88 @ $10 (installed)	880.00				
(4) Crossarms: 6', 2" x 6" treated with end crossarms doubled 1,584 @ $2.25 each	3,564.00				
(5) Braces: 1" x 4" wood OR wire twisted from 2 x 6 to lag screw on post 1,496 @ 60¢ each (installed)	897.60				
(6) Vine Stakes: 6', 1,496 @ 60¢ each	871.20				
(7) Wire: 13 gauge, high tensil, 4 wire (3 top, 1 on post) 30 rolls for 10 acres(3 rolls/acre @ $40/roll	120.00				
(8) Staples: 100 lbs. @ 75¢/lb	75.00				
(9) Chain Grab Puller: $65	65.00				
TOTAL COST:	$16,122.00	$1612.20	15	$107.48	$112.85

Cost & Returns Summary for Full-Bearing Kiwifruit
5 Acres Kiwifruit - Part of 40 Acres Vines & Orchard
No Frost Protection - Fogger-Mister Irrigation System

Tulake, Fresno & Kings Counties - California 1981
By J. Larue, F. Yoshikawa & B. Beede, Farm Advisors - P. Thomas SRA

	UNIT	PRICE OR COST/UNIT	QUANTITY	VALUE OR COST/ACRE
1. Gross Receipts from Production: Kiwifruit	Flat	9.500	1942.000	18449.00
Total Receipts:				18449.00
2. Variable Costs:				
Preharvest:				
Pre-Emerge Herb.	Acre	30.000	1.000	30.00
Weed Control	Acre	30.000	1.000	30.00
Pest Control	Acre	20.000	1.000	20.00
Nitrogen	lbs.	0.350	100.000	35.00
Dormant Prune	Hour	5.000	80.500	402.50
Brush Shredding	Acre	10.000	1.000	10.00
Prune-Tie-Sucker	Hour	5.000	11.500	57.50
P-T-S Materials	Acre	10.000	1.000	10.00
Misc. Labor	Hour	5.000	5.004	25.02
Tractor (Fuel-Lube-Repairs)	Acre			3.41
Equipment (Fuel-Lube-Repairs)	Acre			96.03
Buildings(Fuel-Lube-Repairs)	Acre			7.83
Irrigation (Power-Lube-Rep)	AcIn	4.105	30.700	126.04
Machinery Labor	Hour	5.650	18.811	106.28
Irrigation Labor	Hour	5.650	6.300	35.60
Interest on Operating Cap.	Dol.	0.14000	552.045	75.82
Total Preharvest Costs:				1071.02
Preharvest Cost per Flat:				0.5515
Harvest:				
Pick	Flat	0.250	1942.000	485.50
Pack	Flat	2.250	1942.000	4369.50
Hauling	Flat	0.050	1942.000	97.10
Storage - 3 mos.	Flat	0.750	1942.000	1456.50
Selling charges	Flat	0.950	1942.000	1844.90
Total Harvest Costs:				8253.50
Harvest Cost Per Flat:				3.2500
Total Variable Costs:				9324.52
Variable Cost Per Flat:				4.8015
3. Income Above Variable Costs:				9124.48
Income Per Flat:				4.6985
4. Overhead:				
Personal Property Taxes				9.10
Real Property Taxes				50.00
Misc. Office & Bookkeeping (2.50% of total variable costs)				233.11
Total Overhead:				292.21
Overhead Cost Per Flat:				0.1505
Total Cash Costs:				9616.73
Total Cash Cost Per Flat:				4.9520

Tulake, Fresno & Kings Counties - California 1981
(continued)

	UNIT	PRICE OR COST/UNIT	QUANTITY	VALUE OR COST/ACRE
5. Income Above all Cash Costs:				8832.27
Income Per Flat:				4.5480
6. Ownership Costs:				
Depreciation:				
Machinery & Equipment	Acre			40.01
Irrigation System	Acre			132.18
Buildings	Acre			298.90
Trees, Vines or Stand	Acre			355.77
Total Depreciation:				826.87
Capital & Interest:				
Machinery & Equipment		0.14000	250.895	35.13
Irrigation System		0.14000	730.417	102.26
Buildings		0.10670	1812.131	193.35
Trees, Vines or Stand		0.10670	10673.000	569.40
Land		0.10670	5500.000	586.85
Total Interest Charge:				1486.99
Total Fixed Costs:				2313.86
Fixed Cost Per Flat:				1.1915
7. Total of Above Costs:				11930.59
Total Cost Per Flat:				6.1435
8. Net Returns:				6518.41
Net Returns Per Flat:				3.3565

5 Acres Kiwifruit of 40 acre orchard or vineyard
Fogger/Mister Irrigation System - Well Water
Landowner Basis
No Frost Protection
Date Printed: 11/20/81
Harvest Month: 11
Updated 11/20/81
Budget Record Number 202

MATURE ORCHARD MODEL

1984/85 BUDGET (1.4.84-31.3.85)

NOVEMBER 1984 FINAL REVISION

1. PHYSICAL DESCRIPTION

The mature orchard model is derived from orchards which are nine years old or have achieved a production level of 5,000 trays/hectare. The model is 4.5 effective ha with a mature area of 4.0 ha, a small developing, producing area of 0.5 ha and 0.2 ha in another subtropical crop. It is an owner operated block. The orchardist has no income from other sources. Packing and cool storage of kiwifruit is done through a cooperative packhouse/coolstore operation.

PHYSICAL DETAILS

Total Property Size	8.2 ha
Total Sheltered Area of Kiwifruit	6.9 ha
Kiwifruit - Mature	4.0 ha
- Producing/Developing	0.5 ha
Effective Planted Area	4.5 ha
Other Crops; eg Tamarillos, Avocados	0.2 ha

2. PRODUCTION

Production levels of the 1984 crop were lower than for 1983. This was due to the 1984 season being a low or "off" year in the biennial fluctuating production of kiwifruit in the Bay of Plenty. The other factor contributing to this low level was bud rot. The May 1985 production level per hectare is likely to be similar to that of May 1983 and average yields of 6,000 trays/ha should be achieved.

The Bay of Plenty produced 76.9% (10,241,669 trays) of the national crop; 70.5% from Tauranga, Te Puke and Katikati and 6.4% from Opotiki and Whakatane (NZKA).

	1983/84 (Actual)		1984/85 (Actual)		
	/Producing/Ha	Total	/Producing Ha	Total	% Change
Export(trays)	5,856	26,352	4,618	20,781	-21.1
Process & Local (tonnes)	5.3	23.85	2.58	11.61	-51
% Packout		80.2		86.8	

3. FINANCIAL

Growers continue to predict a return of $8.60/tray for export fruit as budgeted in August. Published market reports indicate this return should be achieved or bettered; $8.60 is a 10% increase in price over 1983 prices and means that kiwifruit prices are holding in real terms. Our Budgeted Orchard Income remains the same as the August report.

Since the August budget we have increased and improved the orchardist panel. As a result there are minor changes to budgeted costs, but a major change in financial charges and new borrowing in the budget. The new figures more accurately reflect the overheads on mature kiwifruit orchards. Financial charges and new borrowing are 50% lower in this new model and the 1983/84 results have been adjusted accordingly.

> Mature orchards vary widely in their debt servicing; tax; development and capital expenditure. Mature orchards in their first 2-3 years of full production along with orchards with investment in new orchards or other farming operations have the highest debt loading. Advisory staff in Tauranga, Whakatane and Hamilton would appreciate feedback from readers on this aspect of our model.

The main features of the mature model are as follows:

1. 1984/85 incomes per orchard are 15% down on 1983/84. Costs are down due to lower harvest costs of a lighter crop. Net Orchard Income is 21% down on 1983/84, as a result of the lower yields.

2. Increases in wages, vehicle expenses and some other costs will only have a minor impact on the 1984/85 budget. We expect significant cost increases in the 1985/86 budget, to be prepared in March 1985.

3. Debt servicing is similar to 1983/84 and there has been less development by mature orchards.

4. There is still a high level of confidence among mature orchardists in the long term future. The market signals indicate that fruit sizes of counts 30 - 39 are preferred and the NZ Kiwifruit Authority has given clear direction to growers with an increased penalty on count 46 fruit. These market signals plus the lower returns in 1984 mean that more growers are taking a critical look at their management practices. The evidence for this can be seen in more widespread testing of light pruning and fruit thinning; over 100 growers are involved in Advisory Services Vine Performance System; new and established orchardists testing new structures and vine management systems are increasing.

5. 1985/86 season has started well with good flower numbers on mature orchards. Yields similar or better than 1983 season are expected. When preparing the 1985/86 budget in March we will expect a significant increase in on-orchard costs and overheads. The effects of the removal of export incentives and sensitivity analyses prepared by MAF Economics Division will be included in the March budget.

FINANCIAL SUMMARY:

Mature Orchard Model

(Budget year 1 April - 31 March)

	1983/84 $/Orchard		1984/85 $/Orchard
Cash Orchard Income	215,729	-15%	183,400
Less Cash Orchard Expenditure	134,351	-11%	119,000
NET ORCHARD INCOME	81,378	-21%	64,400
Less Living & Tax	14,432	+31%	19,000
Debt Servicing	25,154		25,000
Surplus for Ploughback	41,792	-51%	20,400
Plus New Borrowing	5,000		4,000
	46,792		24,400
Less Development & Capital Ex.	21,429	-53%	10,000
CASH SURPLUS/DEFICIT:	+$25,363		+$14,400

DEVELOPING ORCHARD MODEL : PRODUCING
1984/85 FINAL BUDGET : NOVEMBER 1984

1. PHYSICAL DESCRIPTION

The developing, producing orchard model is derived from orchards which are four to eight years old, or are exporting, with production less than 5,000 trays/ha. The model is 6.2 effective hectares, largely producing, and a small area planted in another crop. The block is owner operated, and the owner is investing in a cooperative coolstore.

PHYSICAL DETAILS

Total Property Size	8.6 ha
Total Sheltered Area of Kiwifruit	7.3 ha
Kiwifruit - Producing	6.0 ha
- Non-producing	0.2 ha
Effective Planted Area	6.2 ha
Other Crops; eg Tamarillos, Persimmons	0.3 ha

2. PRODUCTION

As with the mature orchard, production is lower this year than the 1983 season due to the "off" year and bud rot losses. Pre-season estimates in March were very close to actual production.

	1983/84 (Actual) /Producing Ha	1983/84 (Actual) Total	1984/85 (Actual) /Producing Ha	1984/85 (Actual) Total	% Change
Export (trays)	2,351	14,576	1,767	10,955	-24.8
Process & Local (tonnes)	1.55	9.6	1.85	11.57	+19.8
% Packout		84.8		77.8	

3. FINANCIAL

No changes since August.

FINANCIAL SUMMARY

Developing-Producing Orchard Model
(Budget Year 1 April - 31 March)

	1983/84 $/Orchard		1984/85 $/Orchard
Cash Orchard Income	120,545	-15%	101,948
Less Cash Orchard Expenditure	91,953	- 5%	87,635
NET ORCHARD INCOME:	28,592	-50%	14,313
Less Living & Tax	12,595		12,900
Debt Servicing	22,183		26,565
Surplus for Ploughback	-6,186	-300%	-25,152
Plus New Borrowing & Salaries	18,596		35,200
	12,410		10,048
Less Development & Capital Exp.	24,013		28,811
CASH SURPLUS/DEFICIT:	-$11,603	-62%	-$18,763

The main features of this group are:

(a) Financially the most difficult period in orchard development and most orchards need to continue borrowing and provide capital inputs from sale of assets or salaries.

(b) Many of these orchards will reach full production in 1987 or 1988. Low prices or crop failure in these seasons will have a dramatic effect on their profitability. Average debt servicing of 26,000 per orchard will cost $1.00 per tray when they reach full production.

(c) There are many orchardists in this group testing new vine management techniques to achieve higher yields per hectare of export quality fruit in the preferred size range.

DEVELOPING ORCHARD MODEL : NON-PRODUCING

1984/85 FINAL BUDGET : NOVEMBER 1984

1. PHYSICAL DESCRIPTION

The developing non-producing orchard model is derived from orchards which are less than four years old, and have not yet produced an export crop. The model is 6.3 effective hectares, all non-producing. The ownership structure of the block is a partnership, with the on-orchard partner also with a job off the property. His partner(s) is involved in a non-horticultural business from which he makes capital contributions.

PHYSICAL DETAILS

Total Property Size	11.2 ha
Total Sheltered Area of Kiwifruit	8.6 ha
Effective Planted Area	6.3 ha

2. FINANCIAL

Since the August budget there has been an increase of 30% in capital purchases. This is due to growers buying equipment and materials sooner than planned and should result in lower capital requirements in the 1985/86 year.

No other changes since August budget.

3. FINANCIAL SUMMARY

Developing-Non-Producing Orchard Model
(Budget Year 1 April - 31 March)

	1983/84 $/Orchard		1984/85 $/Orchard
Cash Orchard Income	9,951	-10%	9,000
Less Cash Orchard Expenditure	18,415	+27%	23,479
NET ORCHARD INCOME:	-8,464	-71%	-14,479
Less Living & Tax	8,393		8,174
Debt Servicing	12,828		17,948
Surplus for Ploughback	-29,685	-36%	-40,601
Plus New Borrowing, Salaries & Capital Contribution	71,823		46,150
	42,138		5,549
Less Development & Capital Expenses	25,939		30,000
CASH SURPLUS/DEFICIT:	+$16,199		-$24,451

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3. J. Templar, Economics Division, MAF, Wellington

SOURCES OF PROMOTIONAL MATERIAL

CALIFORNIA KIWIFRUIT COMMISSION
1540 River Park Drive, Suite 120
Sacramento, California 95816
(916) 929-5314

KIWI GROWERS OF CALIFORNIA
1151 Los Rios Drive
Carmichael, California 95608
(916) 484-1427

NEW ZEALAND KIWIFRUIT AUTHORITY
1714 Stockton Street
San Francisco, California 94133
(415) 398-7278

REFERENCES

Handling, Packing and Transport Methods (5)

LOTTER, J. de V. 1982. The kiwifruit industry in South Africa - a new evaluation. The Deciduous Fruit Grower, September: 366-383.

. 1981. Kiwifruit harvesting and packing - methods and storage techniques. Ministry of Agriculture and Fisheries, AgLink HPP 238.

FLETCHER, W.A. 1976. Growing Chinese Gooseberries. Ministry of Agriculture and Fisheries.

. 1982. Kiwifruit diseases - symptoms, damage and control. Ministry of Agriculture and Fisheries, AgLink HPP 237.

. 1984. Kiwifruit diseases and non-pathogenic damage - symptoms and control. Ministry of Agriculture and Fisheries, AgLink HPP 237.

HAWTHORNE, B.T. and REID, M.S. 1982. Possibility for fungicidal control of kiwifruit fungal storage rots. New Zealand Journal of Experimental Agriculture. 10:333-336.

Methods of Utilization (6)

LOTTER, J. de V. 1982. The kiwifruit industry in South Africa - a new evaluation. The Deciduous Fruit Grower, September: 366-383.

BEUTEL, J.A., WINTER, F.H., MANNERS, S.C. and MILLER, M.W. 1976. A new crop for California: Kiwifruit, California Agriculture 10:5-7.

MOSS, M. 1985. Speech to California State Board of Food and Agriculture, Sacramento, California, March 7.

. 1980. Kiwifruit - a strange New Zealand phenomenon. Kiwifruit Export Promotion Committee.

Trends in World Production (1)

. 1984. Kiwifruit trade is set for dramatic growth. 1984 Produce Marketing Almanac Supplement: 76-80.

. 1984. International Kiwifruit Organization Conference Production Estimates, Te Puke, New Zealand, November, 1984.

. 1984. Kiwifruit Monitoring Report. Ministry of Agriculture and Fisheries for the Advisory Services Division.

LOTTER, J. de V. 1982. The kiwifruit industry in South Africa - a new evaluation. The Deciduous Fruit Grower, September: 366-383.

BEUTEL, J.A. 1982. Kiwifruit production in California. Kiwifruit Growers of California information pamphlet.

Pack Specifications (3)

BEUTEL, J.A. 1982. Kiwifruit production in California. Kiwifruit Growers of California information pamphlet.

FLETCHER, W.A. 1976. Growing Chinese Gooseberries. Ministry of Agriculture and Fisheries.

LOTTER, J. de V. 1982. The kiwifruit industry in South Africa. A new evaluation. The Deciduous Fruit Grower, September: 366-383.

. 1981. Kiwifruit harvesting and packing - methods and storage techniques. Ministry of Agriculture and Fisheries. AgLink HPP 238.

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5. **Warner**, Brent. District Horticulturist, B.C. Ministry of Agriculture & Food.